Environment
Environnement
Ontario

CLEAN WATER REGULATION: Pulp & Paper Sector

The pollution prevention limits are practical, progressive, and environmentally sound.

Eliminating substances of concern

Ontario has unveiled comprehensive water pollution regulations to prevent the discharge of toxic contaminants from the province's pulp and paper mills. Based on current scientific findings, monitoring data and recent advances in pulp and paper-making technology, the proposed limits will prohibit the release of substantial amounts of hazardous chemicals every year.

The clean water regulation for the pulp and paper sector, issued under the Municipal Industrial Strategy for Abatement (MISA) program, is a breakthrough in Ontario's campaign against water pollution. The goal of MISA is the virtual elimination of persistent toxic substances in the effluents discharged from pulp and paper mills to the province's rivers and lakes.

The clean water regulation promotes a new direction for protecting the environment — pollution prevention. Today's low-waste production technologies save raw materials, water and energy while dramatically cutting the amount of pollution that must be treated.

The stricter environmental standards in the regulation can be turned to a firm's competitive advantage. Stressing pollution prevention and a switch to less-toxic process chemicals over expensive, end-of-the-pipe solutions will help companies meet the regulation effectively.

A more efficient, more productive, and more competitive pulp and paper industry will be better positioned to meet the challenges of changing world paper markets. Purchasers in both the public and private sector are increasingly demanding environmentally-friendly products. To ensure they are well positioned for future markets, Ontario's pulp and paper industry must be able to offer recycled newsprint, chlorine-free papers and other green consumer products.

The draft pulp and paper regulation doesn't specify what kind of abatement equipment a company must install, or how it must treat its waste waters. Instead, the regulation sets technically feasible, scientifically sound standards that will reduce the amount of contamination a mill may release. In the case of organochlorines, the regulation will stimulate the development of new technologies that will eliminate their release.

The limits will take effect at the end of 1995, with additional AOX reductions phased in over the next six years. The clean water regulation will ensure the health of the environment and give companies time to prepare long-range plans to modernize plants, upgrade aging equipment, and expand into new product lines.

"The Ontario government's goal is for a zero discharge of organochlorines by 2002. By eliminating organochlorines in stages, we have addressed industry's requests for practical timeframes and long-term certainty so it can plan for its future investments."
— Environment Minister Ruth Grier

The limits are based on what can be achieved using low-waste, modern paper-making technologies.

Over 90% of the organochlorines discharged by industry into the province's waterways originate from the pulp and paper sector.

Ten parameters are covered by the new clean water regulation

AOX: Adsorbable Organic Halides, an analytical method for measuring all organochlorines collectively rather than individually; formed as an unwanted by-product of the chlorine-based pulp bleaching process used in kraft mills.

BOD5: Biochemical Oxygen Demand, a measure of the amount of oxygen needed by microorganisms to break down organic wastes over a five-day period

Chloroform: a by-product of chlorine bleaching, this organochlorine is a suspected human carcinogen (cancer-causing agent)

Phenol: used as a disinfectant or to make resins, may cause cancer

Toluene: a dangerous solvent that attacks the nervous system and is very toxic to aquatic communities

2,3,7,8 TCDD: an organochlorine and the most toxic form of dioxin

2,3,7,8 TCDF: also an organochlorine and the most toxic furan

TP: Total Phosphorus, the amount of dissolved and particulate, organic and inorganic phosphorus

TSS: Total Suspended Solids, the dirt and grit that can clog the gills of fish

Toxicity: a standardized test to assess whether a mill's effluent kills fish or small invertebrates over a specified period

The zero discharge of AOX by 2002

Prior to the release of this draft regulation, the provincial guidelines for the pulp and paper industry did not reflect what efficient, low-waste technologies can achieve. There were no common industry standards that applied to all the direct discharging mills. Many harmful pollutants were not regulated at all, and the standards for a number of other contaminants still allowed unacceptably high levels of pollution.

The regulation sets new effluent limits for ten different parameters: adsorbable organic halides (AOX), biochemical oxygen demand (BOD5), chloroform, phenol, toluene, 2,3,7,8 TCDD (a dioxin), 2,3,7,8 TCDF (a furan), total phosphorus (TP), total suspended solids (TSS), and aquatic toxicity. Specific limits are specified for each of the province's 26 mills depending on the pulp and paper subsector they fall under.

The Ontario government is committed to the zero discharge of the organochlorines (known collectively as AOX, a term that refers to the analytical method used to measure their presence) from the eight Ontario kraft mills that bleach pulp with chlorine. Organochlorines are a large family of chlorine-based compounds which are generally toxic and include mutation and cancer-causing agents.

The Ontario government's objective is to eliminate AOX entirely from the industry's effluents by the year 2002. To achieve this goal, each kraft mill

must reduce their loadings and meet the limits of 1.5 kg/tonne AOX by 1995 and 0.8 kg/tonne by 1999. As well, each kraft pulp mill must submit a series of detailed AOX elimination plans outlining how it intends to meet the government's goal of zero AOX by 2002. The first is due six months after the clean water regulation takes effect. Interim plans must be completed by December 31, 1995 with the final plans due by the end of 1998.

The environmental impact will be widespread and sustained. By 1995, both BOD and toluene discharges will be slashed by 85% from 1990 levels, phenol by 88% and chloroform by 96%.

The use of new technologies and process changes that will prevent these pollutants from entering the environment will also significantly reduce the levels of other contaminants. By reducing the ten parameters specified in the regulation, the mills will also cut the release of sulphide, volatile suspended solids, chlorinated phenolics and several toxic resin and fatty acids.

The Great Lakes are the world's largest source of fresh water. The Pulp and Paper regulation furthers the Ontario government's continuing commitment to the protecting the Great Lakes and adhering to the US - Canada Great Lakes Water Quality Agreement.

Protecting the Great Lakes

The new regulation will improve the quality of the Great Lakes making them more hospitable for fish and other wildlife. The regulation will stem the build-up of dangerous toxic compounds, protect human and aquatic health and help maintain an acceptable level of water quality in the Great Lakes.

Six of the province's kraft mills discharge their wastewaters directly into the Great Lakes basin. The elimination of AOX will help safeguard the drinking water supplies of the more than 30 million people in Canada and the United States who live in the basin.

In its 1992 report on the Great Lakes, the International Joint Commission stated that organochlorines are "dangerous to the environment, deleterious to the human condition, and can no longer be tolerated in the ecosystem, whether or not unassailable scientific proof of acute or chronic damage is universally accepted."

The proposed effluent limits support the recommendations of the International Joint Commission to phase out persistent toxic discharges to the Great Lakes.

The pulp and paper sector at a glance

Ontario's pulp and paper industry employs 16,000 men and women, making it the fifth largest manufacturing sector in the province. The industry provides one out of every three manufacturing jobs in Northern Ontario.

There are 26 pulp and paper mills discharging waste water directly into Ontario's lakes and rivers. Five of these plants are located in Eastern Ontario, six in South-Central Ontario, and 15 in Northern Ontario. Their waste waters either flow through northern watersheds into Lake Winnipeg and James Bay, or drain south into the Great Lakes. The effluent from one mill, located near Huntsville, drains into Vernon Lake.

Eighteen of these mills produce pulp directly from logs or wood chips, nine through a variety of chemical/mechanical methods, and nine through the kraft process. Eight of the nine kraft mills also use chlorine to bleach pulp. The province's remaining mills manufacture paper products from purchased pulp, some of these facilities relying increasingly on waste paper.

The regulation divides Ontario's 26 pulp and paper mills into four subsectors based on the pulp and paper technology and processes they employ.

Sulphate (kraft) mills:
Boise Cascade, Fort Frances
Canadian Pacific Forest Products, Dryden
Canadian Pacific Forest Products, Thunder Bay
Domtar, Cornwall
Domtar, Red Rock
Eddy Forest Products, Espanola
James River, Marathon
Kimberly-Clark, Terrace Bay
Malette, Smooth Rock Falls

Sulphite-mechanical pulp mills:
Abitibi-Price Fort William Mill, Thunder Bay
Abitibi-Price, Provincial Papers, Thunder Bay
Abitibi-Price, Iroquois Falls
Boise Cascade, Kenora
Quebec & Ontario Paper, Thorold
St. Marys Paper, Sault Ste. Marie
Spruce Falls, Kapuskasing

Corrugating mills:
Domtar, Trenton
MacMillan-Bloedel, Sturgeon Falls

Deinking/board/fine papers/tissue mills:
Beaver Wood Fibre, Thorold
Domtar Fine Papers, St. Catharines
Eddy Forest Products, Ottawa
Noranda Forest Products, Thorold
Kimberly-Clark, Huntsville
Kimberly-Clark, St. Catharines
Strathcona, Napanee
Sonoco, Trenton

Eight locations in Ontario designated as areas of concern by the International Joint Commission have pulp and paper mills that contribute to the area's pollution problem: Thunder Bay, Nipigon Bay, Jackfish Bay, Peninsular Harbour/Marathon, Spanish Harbour, Sault Ste. Marie, Cornwall, Trenton (Bay of Quinte).

What are the major environmental concerns?

The Ministry of Environment is concerned about the environmental impact of the wide variety of toxic compounds, oxygen-depleting substances and suspended solids found in the waste waters from pulp and paper plants. The discharges from mills contaminate water, sediments and aquatic life both in the immediate receiving waters and throughout the Great Lakes ecosystem.

Over the last 20 years, pollution control efforts have been directed towards reducing the huge quantities of suspended solids and organic wastes generated by the industry. While substantial reductions have been achieved, these substances still pose a major pollution problem.

In addition, environmental scientists continue to express concern about the presence and impact of persistent or acutely toxic substances in mill effluents. Many of these compounds do not readily break down and may bioaccumulate up the food chain to threaten both environmental and human health. Those pollutants raising the greatest environmental concern are the persistent toxic chemicals (such as the organochlorines and heavy metals), sulphur compounds, and fish-killing resin and fatty acids.

Some 75 pollutants have been measured overall in the waste waters discharged by mills; the toxic contaminants vary depending on the type of pulp and paper-making process and chemicals used. Organochlorines

New pulp and paper production systems, water conservation measures, and pollution prevention technologies can cut discharges dramatically.

(AOX), unwanted byproducts of the chlorine bleaching process found in the effluents of kraft mills, are a parameter of special concern due to their toxicity and possible persistence. These stable chemicals can build up in the tissues of plants and animals with chronic and irreversible effects. Some may cause mutations or cancers. Dioxins and furans are probably the most notorious compounds in this large family; the regulation singles out chlorinated dioxin 2,3,7,8-TCDD and chlorinated furan 2,3,7,8-TCDF for special attention.

The development of the discharge regulation

The MISA program, under which the clean water regulation falls, was announced in 1986. As a first step, the Pulp and Paper Effluent Monitoring Regulation was made law in July, 1989. A year-long testing program identified and measured the toxic contaminants in the effluent from each of the province's pulp and paper mills.

This information was used by Ministry staff to assess which contaminants posed an environmental threat. The Ministry was aided by a joint technical committee with representatives from the pulp and paper industry and the MOE, an observer from Environment Canada and the Minister's MISA Advisory Committee. The Minister also met with mayors from Northern municipalities, industry and labour representatives, and environment groups before the release of the draft regulation.

Most of Ontario's kraft mills have already begun effective programs to comply with the new effluent limits for AOX.

The proposed limits reflect the low levels of contamination one could expect to find in the waste water from a modern mill that uses the best available technology. The requirements for AOX reduction are designed to stimulate the development of new, cleaner pulp and paper-making technology.

In complying with the effluent limits, mills are expected to implement a variety of in-plant measures designed to prevent pollution at source. For example, mills could substitute a less toxic chemical for a more dangerous one, or install a more efficient piece of process equipment — as well as traditional abatement systems designed to treat end-of-the-pipe effluents.

The regulation does not require a mill to install a particular type of control system or equipment; therefore a company is free to find the most effective or cost-efficient way to meet the effluent limits.

The elimination of AOX

More than 250 different organochlorines have been detected in the effluents from pulp and paper mills. Measured collectively as Adsorbable Organic Halides or AOX, it makes sense to control them collectively rather than set dozens of separate effluent limits for different organochlorines. This is the approach being taken by British Columbia and Quebec, as well as a number of European countries.

In 1989, the MOE issued Control Orders requiring all kraft mills to reduce AOX effluents to 2.5 kilograms per tonne of air-dried bleached pulp by December 31, 1991. As a result, a number of mills began to reduce or abandon the use of molecular chlorine in favour of chlorine compounds that produce less AOX. These efforts have continued so that today most of the province's kraft mills are close to the 1.5 kilogram limit proposed in the new regulation. However, despite these reduction efforts, mills are still discharging more than 5,500 tonnes of AOX each year.

AOX can no longer be tolerated in the ecosystem; discharges must be further reduced and eventually eliminated. Under the new clean water regulation, kraft mills will have to cut monthly average discharges to 1.5 kilograms of AOX per (air-dried) tonne of pulp they produce by December 31, 1995. By the end of 1999, the limit drops to 0.8 kilograms.

While they are achieving these reductions, each mill must prepare and submit a series of elimination plans to show how it will be able to meet the government's objective of zero discharge of AOX by the year 2002.

How will the discharge regulation work?

When the new effluent limits go into effect on December 31, 1995, they will significantly reduce the release of contaminants into the environment. Much of the BOD, toluene, phenol and chloroform will be removed from pulp and paper mill waste waters. The most toxic forms of dioxin and furan must be reduced to non-detectable levels. The other dangerous organochlorines will be eliminated altogether in a series of phased stages. In all, stringent new effluent limits are set for ten waste water parameters.

The type of mill and the processes it employs will play a role in determining the effluent limits that must be met. For instance, a kraft mill that uses a chlorine-based bleaching process will need to implement a more complex pollution prevention program than a firm that has already made the switch away from chlorine bleaching. The regulation differentiates between four basic classes of pulp and paper mill: (1) sulphate (kraft) mills, (2) mills using a sulphite-mechanical pulping process, (3) corrugating mills, and (4) de-inking/board/fine papers/tissue mills. The regulation sets process effluent limits and monitoring requirements for each of the 26 mills across the province, based on their class, production levels and the daily and monthly discharge standards.

The regulation also incorporates a number of standard monitoring and reporting requirements (in common with the clean water regulations being developed for other MISA sectors). Sections of the regulation govern: compliance monitoring, the location of sampling points, sampling and analytical procedures, toxicity testing, the calculation of loadings, effluent flow measurements, monitoring quality control, stormwater controls, record keeping, and reports to the Ministry.

The day the regulation is filed, pulp and paper mills must begin to compile their sampling plans and stormwater control studies. The AOX standard of 2.5 kilograms per air-dried tonne of pulp applies from day one. The regulation's monitoring, measuring and reporting provisions take effect 90 days later. Daily and monthly limits take effect December 31, 1995.

Parameter	Ontario (Proposed)*	British Columbia	Quebec	Federal
BOD, 5-day	2.91-5.0	7.5-21.0	5.0-9.0	7.5
TSS	4.57-7.87	11.25-37.5	8.0	11.25
TP	0.05-0.08	—	—	—
Chloroform	0.001-0.002	—	—	—
Toluene	0.0001-0.0002	—	—	—
Phenol	0.0002-0.0004	—	—	—
2,3,7,8 TCDD	n.m.***	—	**	n.m.
2,3,7,8 TCDF	n.m	—	**	n.m.
Toxicity		Non-acutely lethal		
AOX	1.5 (Dec 31, 1995)	1.5 (Dec 31, 1995)	1.5-2.5 (Dec 31, 1993)	—
	0.8 (Dec 31, 1999)	0.0 (Dec 31, 2000	1.0-2.0 (Sept 30, 1995)	—
	0.0**** (Dec 31, 2002)	or 2002)	0.8 (Dec 31, 2000)	—

* Monthly loading limits in kilograms/tonne of air-dried pulp
** Total of dioxins and furans not to exceed 15 ppq as 2,3,7,8-TCDD
*** n.m.— Not Measurable
**** Target

What's the next stage?

The draft clean water regulation is being released for a 60-day public review. All the comments will be collected, reviewed and evaluated by Ministry staff, necessary amendments will be made to the regulation, and a final draft will be published in the Ontario Gazette.

How can I learn more?

To receive more information on the Draft Effluent Limits Regulation for the Pulp and Paper Sector, fill out the coupon on this page and mail it to:

MISA Pulp and Paper Effluent Limits Regulation
Ontario Ministry of the Environment,
135 St. Clair Avenue West,
Toronto, Ontario M4V 1P5

- ❒ Send me the Draft Pulp and Paper Effluent Limits Regulation
- ❒ Send me more information on the MISA program
- ❒ Send me list of related background documents and technical reports

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Do you have any questions or comments?

You can also call the Ministry of Environment Public Information Centre at 1-800-565-4923, or the following MOE Regional Offices:

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Send your comments to: Ruth Grier, Minister of the Environment, 135 St. Clair Avenue West, Toronto, Ontario M4V 1P5

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